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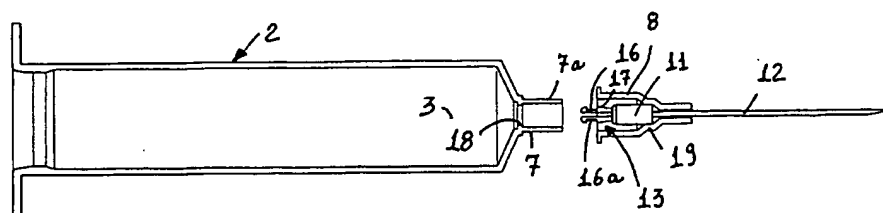
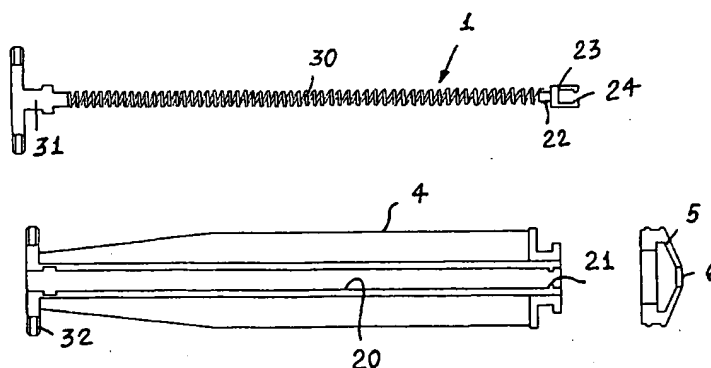
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DISPOSABLE SAFETY SYRINGE INCLUDING AN AUTOMATICALLY RETRACTABLE NEEDLE



(57) Abstract: The present invention relates to a disposable safety syringe including an automatically retractable needle for preventing said syringe from being reused, comprising a cylindric body defining, at one end thereof, a needle coupling end-piece and being opened at the other end portion thereof for introducing therein a piston having a sealing gasket. The main feature of the invention is that on said piston are provided engaging means for engaging and retracting the needle after the delivering of the injection liquid.

DESCRIPTION

**DISPOSABLE SAFETY SYRINGE INCLUDING AN AUTOMATICALLY
RETRACTABLE NEEDLE****BACKGROUND OF THE INVENTION**

5 The present invention relates to a disposable safety syringe, including an automatically retractable needle, for preventing the syringe from being reused.

10 As is known, a main problem of disposable syringes is that deriving from a possibility of reusing said syringes and a possibility that the syringe needle can accidentally prick the operator of the syringe.

15 For solving the above mentioned problem, safety syringes have been already constructed, in which are provided resilient means, operating between the syringe body and plunger, so as to cause the syringe needle to be automatically retracted, after having being used, since the syringe plunger is
20 resiliently withdrawn from the syringe body.

 Such a solution, however, has not been found as practical, since, during a regular use of the syringe, it is necessary to overcome the resilient urging force provided by the spring, and
25 which must be of a comparatively high value, in order to assure a satisfactory withdrawing of the needle but which actually hinders a proper use by the operator.

30

SUMMARY OF THE INVENTION

 Accordingly, the aim of the present invention is to overcome the above mentioned

drawbacks, by providing a disposable safety syringe, including an automatically retractable needle, for preventing the syringe from being reused, and allowing the syringe needle to be automatically
5 retracted into the syringe body by resilient means which are inoperative during a regular use of the syringe.

Within the scope of the above mentioned aim, a main object of the present invention is to
10 provide such a disposable safety syringe the needle of which can be retracted by very simple and efficient retracting means.

Another object of the present invention is to provide such a disposable safety syringe which,
15 owing to its specifically designed constructional features, is very reliable and safe in operation.

Yet another object of the present invention is to provide such a disposable safety syringe which can be easily made starting from easily available
20 elements and materials and which, moreover, is very competitive from a mere economic standpoint.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more
25 apparent hereinafter, are achieved by a disposable safety syringe including an automatically retractable needle, said syringe comprising a syringe cylindric body defining, at one end portion thereof, an end piece for coupling the syringe needle and being
30 opened, at the other end portion thereof, for receiving a syringe plunger including a sealing gasket, characterized in that said syringe further

comprises, on said syringe plunger, engaging means for engaging and retracting said needle, after having delivered the injection liquid.

5 **BRIEF DESCRIPTION OF THE DRAWINGS**

Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred, though not exclusive, embodiment of a
10 disposable safety syringe including an automatically retractable needle for preventing the syringe from being reused, and being illustrated, by way of an indicative but not limitative example, in the accompanying drawings, where:

15 Figure 1 is a schematic exploded view illustrating the disposable safety syringe according to the present invention;

 Figure 2 is a cross-sectional view of the syringe illustrating said syringe in a use condition
20 thereof;

 Figure 3 is a schematic view illustrating the end step of the injectable liquid delivering operation;

 Figure 4 illustrates, on an enlarged scale, the position assumed by the needle and plunger of
25 figure 2;

 Figure 5 illustrates, on an enlarged scale, the position of the syringe needle and plunger or piston in the condition shown in figure 3; and

30 Figure 6 is a schematic view illustrating the retracting operation for retracting the syringe needle being performed by resilient means.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the number references of the above mentioned figures, the disposable safety syringe, including a retractable needle, according to
5 the present invention, which has been generally indicated by the reference number 1, comprises a syringe cylindric body 2, defining an inner chamber 3, in which a syringe piston or plunger can slide, said syringe plunger or piston being indicated by the
10 reference number 4 and including a sealing front gasket 5 having a central opening 6, as it will become more apparent hereinafter.

Making now reference to the syringe constructional details, the syringe cylindric body 2
15 is provided, at one end portion thereof, with an end piece 7, thereon is applied a cap 8, housing in its inside a barrel element 11 which, at one end thereof, is coupled to a syringe needle 12 and, at the other end thereof, comprises resiliently spreadable wings,
20 generally indicated by the reference number 13.

Said wings comprise a tapering portion 14 at their free end, adjoining cut-outs 16 ending with a tooth element 17, abutting against an abutment ring element 18 provided in the attachment region of the
25 end-piece 7.

On the outer surface of the end-piece 7 are provided a plurality of slots 7a for improving the engagement of the cap 8.

Moreover, a further cut-out 16a is
30 provided, which has a curved configuration, so as to substantially prevent the syringe needle from being re-engaged in the mentioned cap as it is withdrawn.

As shown, the cap 8 comprises a cylindric surface 19, therein said barrel element 11 is engaged for providing the required sealing.

The syringe plunger 4 defines, according to
5 a feature of the invention, an axial cavity 20 which, at its portions thereat said gasket 5 is arranged, comprises a stop abutment 21 engaging, as the syringe is used, with an abutment element 22 defined by a nose 23 having clamping elements 24 which can be
10 engaged with the mentioned resilient wings, as it will become more apparent hereinafter.

The nose 23 is coupled to recovering resilient means 30, housed in said axial cavity 20 and which, at the other end portion thereof, engages
15 with a pawl, which can be locked at the flanged end portion 32 of the syringe plunger 30.

With the disclosed arrangement, the nose 23 projects from said central hole or opening 6 and is restrained in a stop abutment position by the stop
20 abutment 21 engaging with the abutment 22.

As the syringe is used, and as shown in figures 2 and 4, the syringe plunger will perform its operating stroke to inject the injection liquid.

Under such a condition, the syringe needle
25 is firmly held in its position due to the provision of the cap 8 and because of the engagement of the engagement of the tooth elements 17 with the locking abutment 18.

At the end of the injection, the clamping
30 elements 24 of the nose 23, by engaging with the tapering portions 14, will cause the wings 13 to be radially contracted, thereby disengaging the tooth

elements 17 from the abutment 18, so as to allow the syringe needle to be disengaged from the mentioned cap.

Moreover, the nose 23 can disengage from
5 the stop abutments 21, under a pushing force, and owing to the provision of the return spring 30, causing the needle to be immediately retracted, inside the axial cavity 20, as is clearly shown in figure 6.

10 In such a condition, the syringe cannot be absolutely reused.

Moreover, the needle will be arranged at a protected region thereby preventing any inuring to the syringe operator.

15 From the above disclosure it should be apparent that the invention fully achieves the intended aim and objects.

In particular, it is pointed out that a safety disposable syringe has been provided which,
20 while having a very simple construction, allows the syringe needle to be automatically retracted upon the injection.

The invention, as disclosed, is susceptible to several modifications and variations, all of which
25 will come within the scope of the invention.

Moreover, all of the constructional details can be replaced by other technically equivalent elements, depending on requirements.

CLAIMS

1. A disposable safety syringe including an automatically retractable needle, said syringe
5 comprising a syringe cylindric body defining, at one end portion thereof, an end piece for coupling the syringe needle and being opened, at the other end portion thereof, for receiving a syringe plunger including a sealing gasket, characterized in that
10 said syringe further comprises, on said syringe plunger, engaging means for engaging and retracting said needle, after having delivered the injection liquid.

2. A disposable safety syringe, according
15 to the preceding claim, characterized in that said engaging and retracting means comprise a nose house inside an axial cavity, formed on said syringe plunger, and that said nose can be coupled to said syringe needle and is connected to a return spring
20 arranged in an axial cavity.

3. A disposable safety syringe, according
to the preceding claims, characterized in that said syringe needle is coupled to a barrel element including resilient wings having, at their end
25 portions, a tapering portion adjoining a cut-out delimited by an abutment tooth element in order to prevent said needle from being retracted, said abutment tooth element being coupled to a locking abutment element.

30 4. A disposable safety syringe, according to one or more of the preceding claims, characterized in that said barrel element is housed inside a cap

which can be pressure coupled to an end piece and that said cap defines, in its inside, a cylindric portion which can be tightly engaged with said barrel element.

5 5. A disposable safety syringe, according to one or more of the preceding claims, characterized in that said engaging and retracting means comprise a stop abutment provided in an axial cavity and engageable with an abutment formed by a nose
10 including clamping elements which can be engaged with resiliently yieldable wings.

 6. A disposable safety syringe, according to one or more of the preceding claims, characterized in that said nose projects from an opening defined by
15 said plunger gasket and that said spring is resiliently preloaded for retracting said needle at the end of the injection liquid delivery operation.

 7. A disposable safety syringe, according to one or more of the preceding claims, characterized
20 in that at least one of the cut-outs defined on said resilient wings is curved so as to cause said needle to be arranged with a slanted orientation and for preventing said needle from exiting again.

 8. A disposable safety syringe including an
25 automatically retractable needle for preventing said syringe from being reused, characterized in that said syringe comprises one or more of the disclosed and/or illustrated features.

1/4

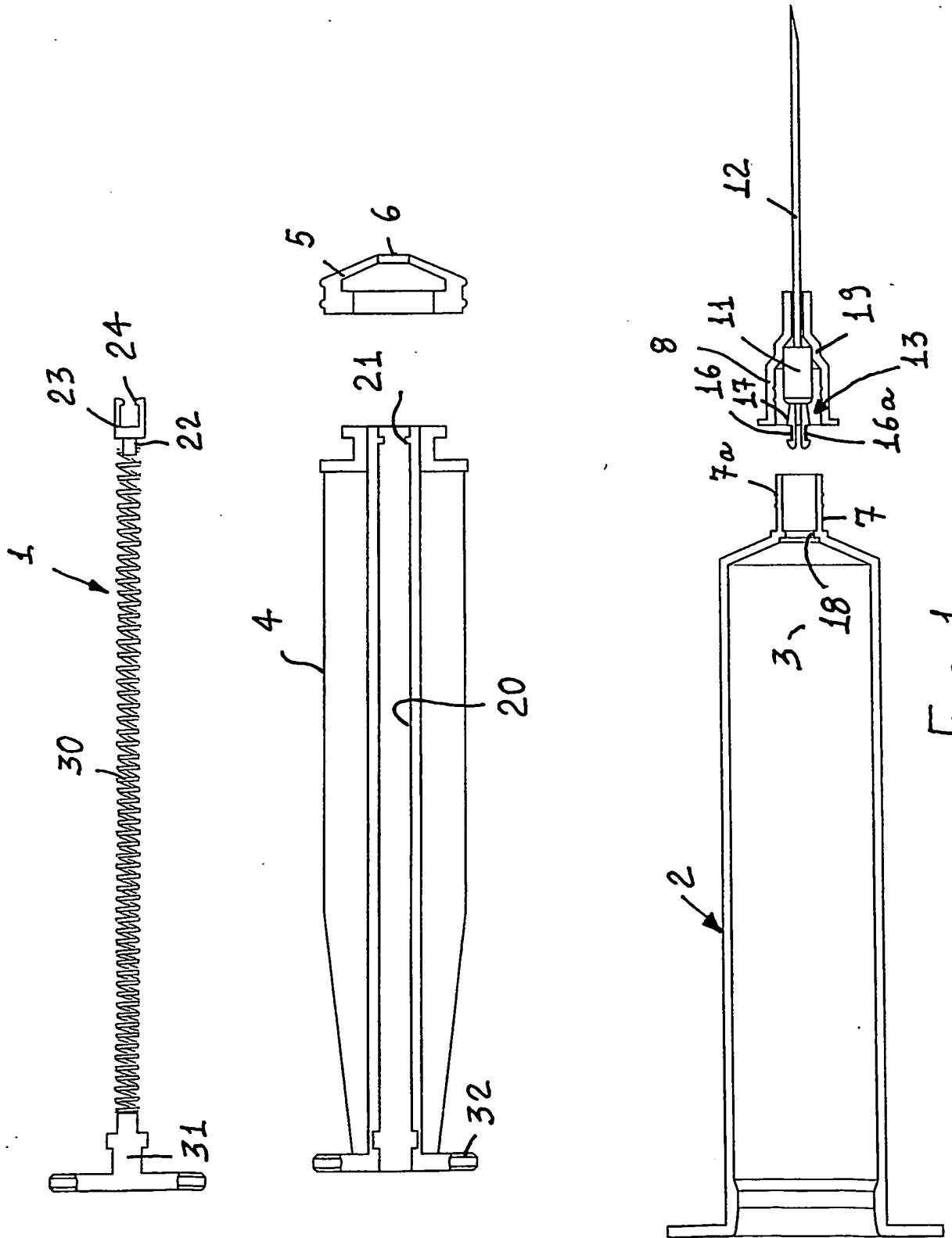


FIG. 1

2/4

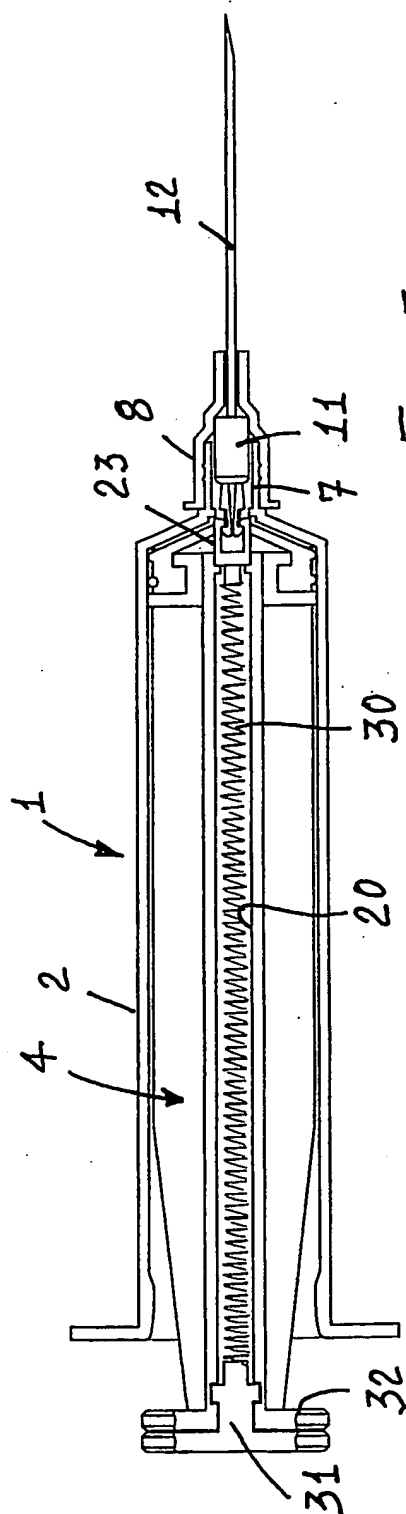


FIG. 3

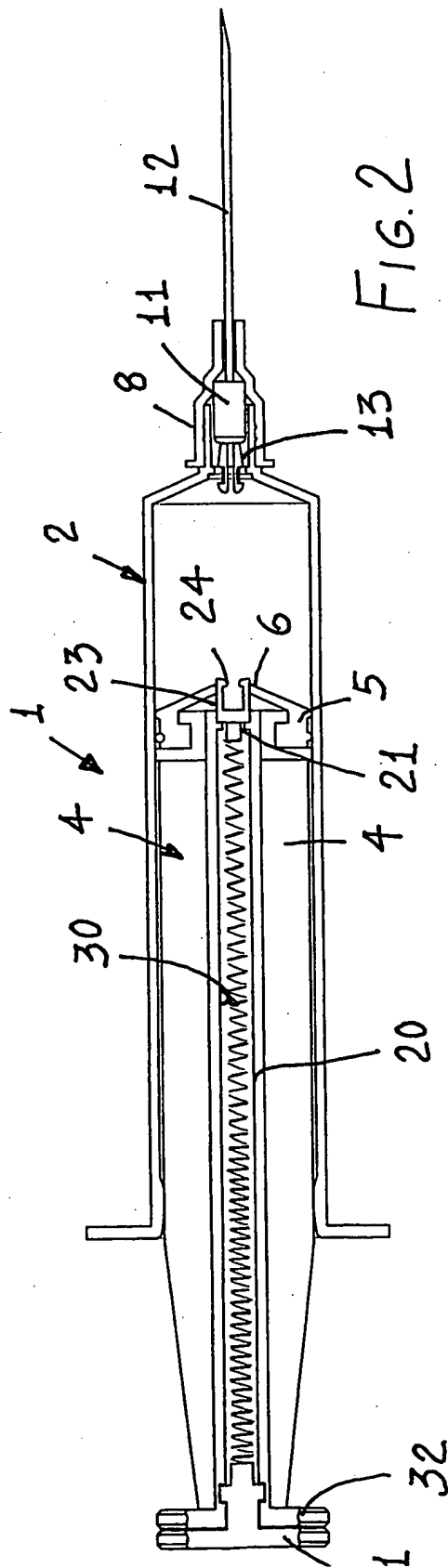


FIG. 2

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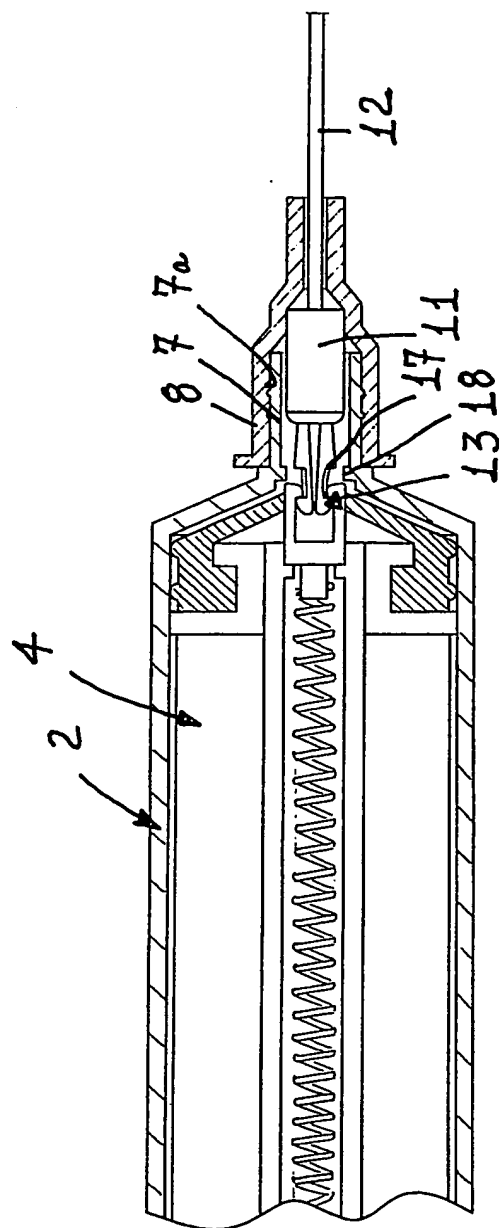


FIG. 5

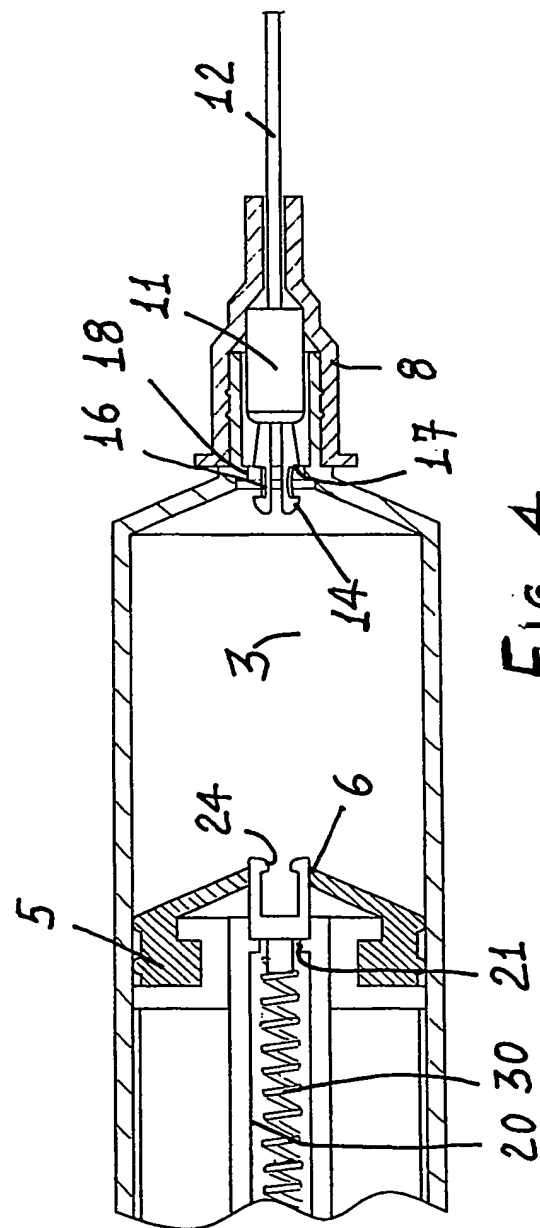


FIG. 4

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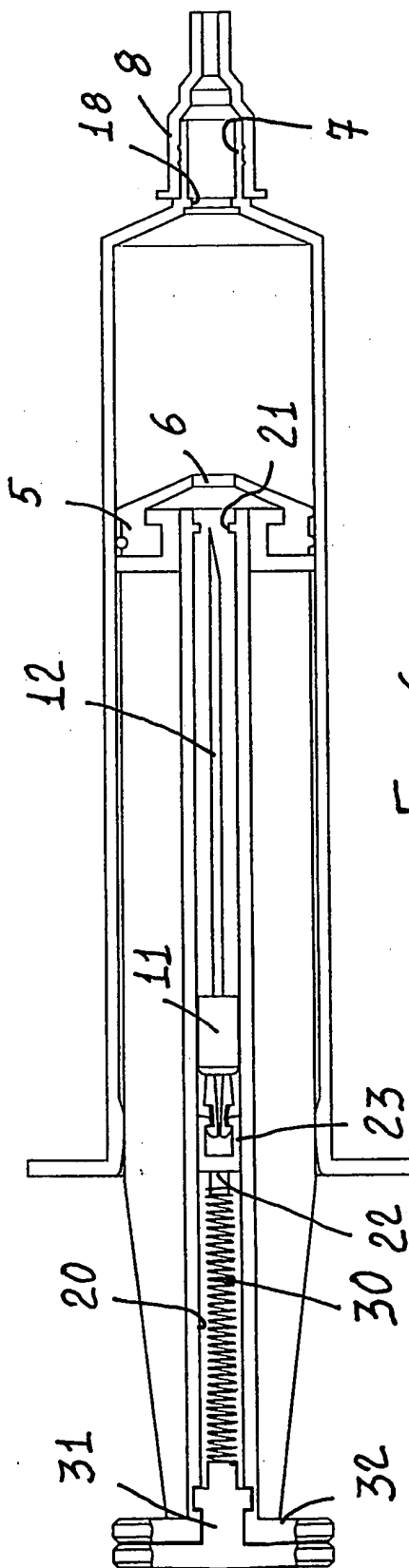


FIG. 6

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(74) Agent: **CICOONA, Franco**; Ufficio Internazionale Brevetti, Dott. Prof. Franco Cicogna, Via Visconti di Modrone, 14/A, I-20122 Milano (IT).

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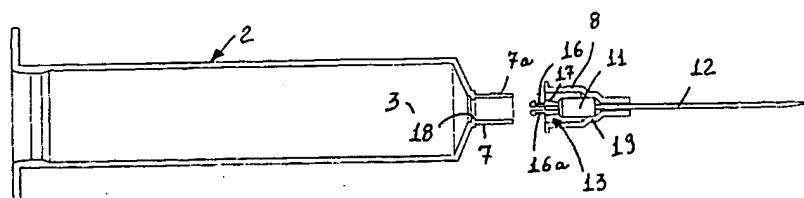
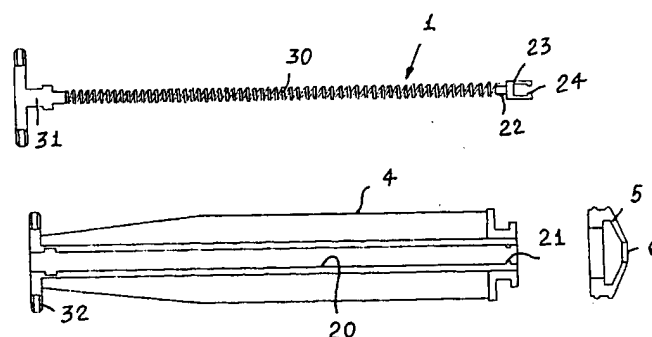
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9 October 2003

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(54) Title: DISPOSABLE SAFETY SYRINGE INCLUDING AN AUTOMATICALLY RETRACTABLE NEEDLE



(57) Abstract: The present invention relates to a disposable safety syringe (1) including an automatically retractable needle (12) for preventing said syringe from being reused, comprising a cylindric body (82) defining, at one end thereof, a needle coupling end-piece (7) and being opened at the other end portion thereof for introducing therein a piston (4) having a sealing gasket (5). The main feature of the invention is that on said piston are provided engaging means (23, 24) for engaging and retracting the needle (12) after the delivering of the injection liquid.

INTERNATIONAL SEARCH REPORT

Int. Application No.

PCT/IT 02/00779

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61M5/32 A61M5/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 378 240 A (MASON DAVID N ET AL) 3 January 1995 (1995-01-03) column 4, line 40 -column 6, line 59; figures 1-5	1-3,5,6
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 03, 30 March 2000 (2000-03-30) -& JP 11 342200 A (AGIFIN SRL), 14 December 1999 (1999-12-14) abstract; figures 1-8	1,4,5,7
X	DE 43 14 395 C (LINDENMAIER PRAEZISION AG) 1 December 1994 (1994-12-01) column 3, line 53 -column 8, line 63; figures 1-6	1-3,5,6

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

16 May 2003

Date of mailing of the international search report

28/05/2003

Name and mailing address of the ISA

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Björklund, A

INTERNATIONAL SEARCH REPORT

Intern

Application No

PC1/11 02/00779

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 505 330 A (PROFARM SPA) 23 September 1992 (1992-09-23) figures 1-4 -----	1,2,5,6
X	US 6 017 325 A (DUCLER ALDO LUIS ET AL) 25 January 2000 (2000-01-25) figures 1-4 -----	1,2,6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IT 02/00779**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 8
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 8

Claim 8 is not clear (Article 6 PCT) because it makes references to the features disclosed and/or illustrated. This is not allowed under Rule 6.2(a) PCT. The rest of the claim is an attempt to define the product by reference to a result to be achieved, contrary to the requirements of Rule 6.3(a) PCT. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to claims 1-7.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte il Application No

PCT/IT 02/00779

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5378240	A	03-01-1995	AT 127026 T AU 644823 B2 AU 6636390 A WO 9107198 A1 CA 2068212 A1 DE 69022066 D1 DE 69022066 T2 EP 0500613 A1 JP 3114203 B2	15-09-1995 23-12-1993 13-06-1991 30-05-1991 09-05-1991 05-10-1995 22-02-1996 02-09-1992 04-12-2000
JP 11342200	A	14-12-1999	IT MI972626 A1	26-05-1999
DE 4314395	C	01-12-1994	DE 4314395 C1 WO 9425092 A1	01-12-1994 10-11-1994
EP 0505330	A	23-09-1992	IT 1248456 B AT 131391 T CA 2063206 A1 DE 69206653 D1 DE 69206653 T2 DK 505330 T3 EP 0505330 A1 ES 2082435 T3 GR 3019261 T3 JP 5084300 A US 5222943 A	19-01-1995 15-12-1995 19-09-1992 25-01-1996 25-07-1996 18-03-1996 23-09-1992 16-03-1996 30-06-1996 06-04-1993 29-06-1993
US 6017325	A	25-01-2000	NONE	